Loudoun County
Solid Waste Management Facility

June 2003 Volume Study Cell IIA and IIB

Date of Aerial Photography: June 25, 2003

submitted to

Loudon County
Office of Solid Waste Management
Leesburg, Virginia

July 2003 ©

L. Robert Kimball & Associates
Architects and Engineers

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Summary of Volume Calculations of the Cell IIA & B
Loudoun County Solid Waste Management Facility

Volume Study End Date	Date Of Flight	Available Airspace Refuse and Cover (cy)	Available Airspace Refuse Only (cy)	Fill Since Last Study (cy)	Months Since Last Study	Monthly Average of Fill (cy)	Comments
Sept. 30, 2000		156,390	149,411	27,454	6	4,576	
Dec. 31, 2000		140,030	133,278	17,651	3	5,884	
March 31, 2001		128,385	121,515	14,282	3	4,761	
June 30, 2001		211,329	204,842	17,967	3	5,989	new final grade applied
Dec 31, 2001		173,742	167,577	37,265	6	6,211	
March 31, 2002		160,821	153, 324	12,494	3	4,165	
June 30, 2002		142,393	134,901	18,346	3	6,115	
Sept 30, 2002	09/25/2003	128,426	120,969	13,764	3	4,588	
Dec 31, 2002	01/09/2003	112,394	104,917	16,104	3	5,368	
March 31, 2003	04/02/2003	101,928	94,451	10,420	3	3,474	
June 30, 2003	06/25/2003	85,513	78,036	16,358	3	5,453	

8/6/2003

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July 29, 2003

Mr. Jeffrey Stoffel
Environmental Monitoring Specialist
Loudoun County Office of Solid Waste Management
906 Trailview Blvd, SE
Suite B
Leesburg, VA 20175

Re: Volume Study for Cell IIA and IIB of the Loudoun County Landfill, June 25, 2003 Aerial Photography Mission

Dear Mr. Stoffel:

The enclosed contains the volumetric data and site mapping for Cell IIA and IIB of the Loudoun County Landfill for the June 25, 2003 aerial photography mission. L. Robert Kimball & Associates, Inc., certifies that all information located herein is accurate and in accordance with the contract terms. The aerial photography was obtained at a scale of 1" = 250', sufficient to produce 1" = 50' scale mapping with two foot contour intervals. The mapping meets National Map Accuracy Standards for its published scale.

Sincerely,

Kathy J. Berkebile

Kathy J. Berkebile
Project Manager

KJB/dlv
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1. INTRODUCTION

1.1 General

L. Robert Kimball & Associates, Inc., (Kimball) of Ebensburg, Pennsylvania performed volumetric calculations under Contract QQ-00409B for the Loudoun County, Virginia Office of Solid Waste Management Landfill. Kimball adhered to the document Requirements for Landfill Mapping Support, Loudoun County Landfill, July 30, 1999. The volumetric calculations consisted of the Active Cell (Cell IIA & B).

L. Robert Kimball & Associates, Inc., provided previous conditions for this report which include the following:

- Contour map of the landfill proper as of October 1, 1999
- Digital Terrain Model (DTM) of the landfill proper as of October 1, 1999
- Contour map of the landfill proper as of March 31, 2000
- DTM of the landfill proper as of March 31, 2000
- Contour map of the landfill proper as of October 3, 2000
- DTM of the landfill proper as of October 3, 2000
- Contour map of the landfill proper as of January 3, 2001
- DTM of the landfill proper as of January 3, 2001
- Contour map of the landfill proper as of April 3, 2001
- DTM of the landfill proper as of April 3, 2001
- Contour map of the landfill proper as of June 25, 2001
- DTM of the landfill proper as of June 25, 2001
- Contour map of the landfill proper as of December 30, 2001
- DTM of the landfill proper as of December 30, 2001
- Contour map of the landfill proper as of March 28, 2002
- DTM of the landfill proper as of March 28, 2002
- Contour map of the landfill proper as of June 27, 2002
- DTM of the landfill proper as of June 27, 2002
- Contour map of the landfill proper as of September 25, 2002
- DTM of the landfill proper as of September 25, 2002
- Contour map of the landfill proper as of January 9, 2003
- DTM of the landfill proper as of January 9, 2003
- Contour map of the landfill proper as of April 2, 2003
- DTM of the landfill proper as of April 2, 2003

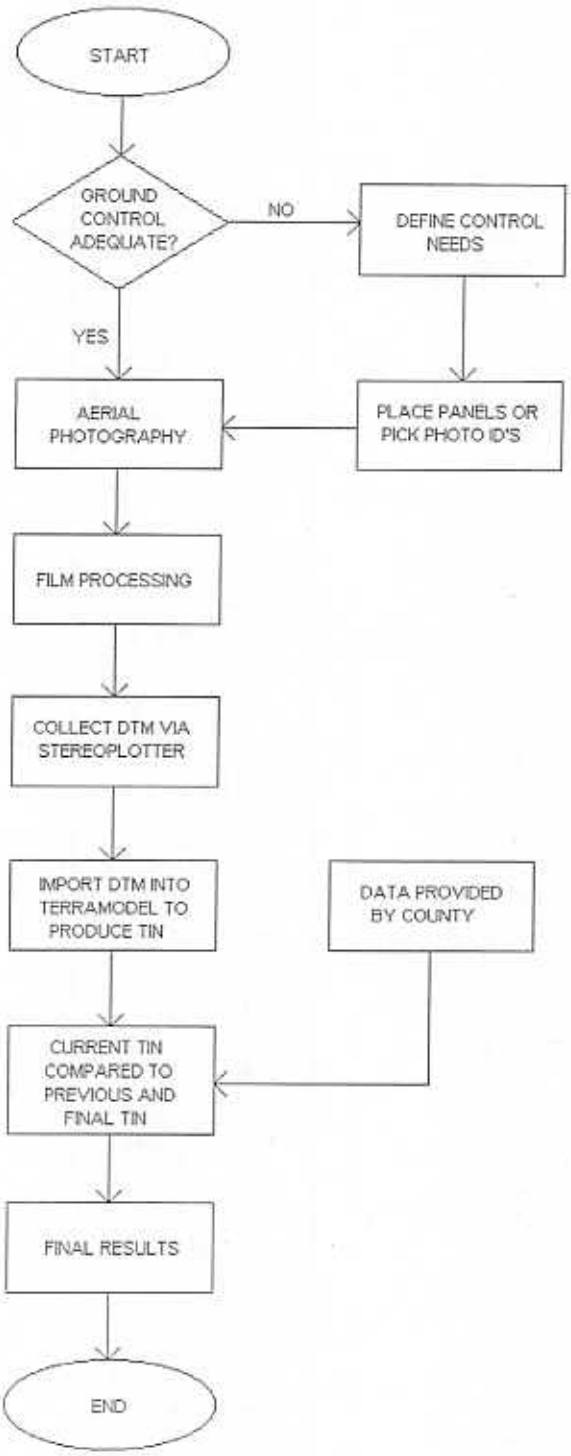
The County had previously provided a CD-ROM containing contours and DTM information from March 31, 1999 and a contour map of the proposed final grade of the landfill proper. Solid Waste Services created a new proposed final grade of the landfill proper in June 2001. Kimball utilized all information in generating the volumetric calculations.

1.2 Purpose

The purpose of this report is to provide the Loudoun County, Virginia Office of Solid Waste Management with volumetric calculations of the Loudoun County Landfill located in Leesburg, Virginia. The Active Cell survey was used to determine the disposal airspace (in cubic yards) consumed in the time elapsed since the last volumetric event and the remaining airspace for disposal.

2. PROCEDURES

The flowchart illustrates the procedural steps undertaken by Kimball.



3. EQUIPMENT

Kimball used the following instrument and software programs for the volumetric calculations:

- A Zeiss P-3 stereoplotter instrument was used for Digital terrain Model (DTM) data collection. The P-3 is a first order analytical instrument. This instrument utilizes KORK Digital Mapping Software for compilation.

- Triangular Irregular Networks (TINs), contour maps, isopachs and profiles of the surfaces were generated using Terramodel software, a product of Spectra Precision Software, Inc. Volume differences were calculated by comparing the TINs of each of the different surfaces.

- Perspective 3-D views were created with ArcView version 3.2 and ARC/INFO version 8.02. Both software packages are a product of Environmental Systems Research Institute, Inc. (ESRI).

4. METHODOLOGY

4.1 Aerial Photography

Kimball utilized black and white aerial photography obtained by our company on June 25, 2003. The 1" = 250' scale photography was used for the current volume calculations. In order to minimize objectionable shadow, the aerial mission was conducted between 10:00 AM and 2:00 PM. Kimball used a Zeiss Jena LMK aerial mapping camera 2015. The U.S. Geological Survey calibrated this camera on January 2003. The film was checked by Kimball photo lab technicians for appropriate forward lap (60%) and image quality and was approved.

4.2 Ground Control

Ground control consisted of existing paneled and photo identifiable points used for the previous mapping. These coordinates were based on Virginia State Plane Coordinates, North Zone, NAD27. Using the aerial triangulation process, additional control points were photogrammetrically added to ensure the accuracy of the mapping.

5. VOLUMETRIC MAPPING – Active Cell

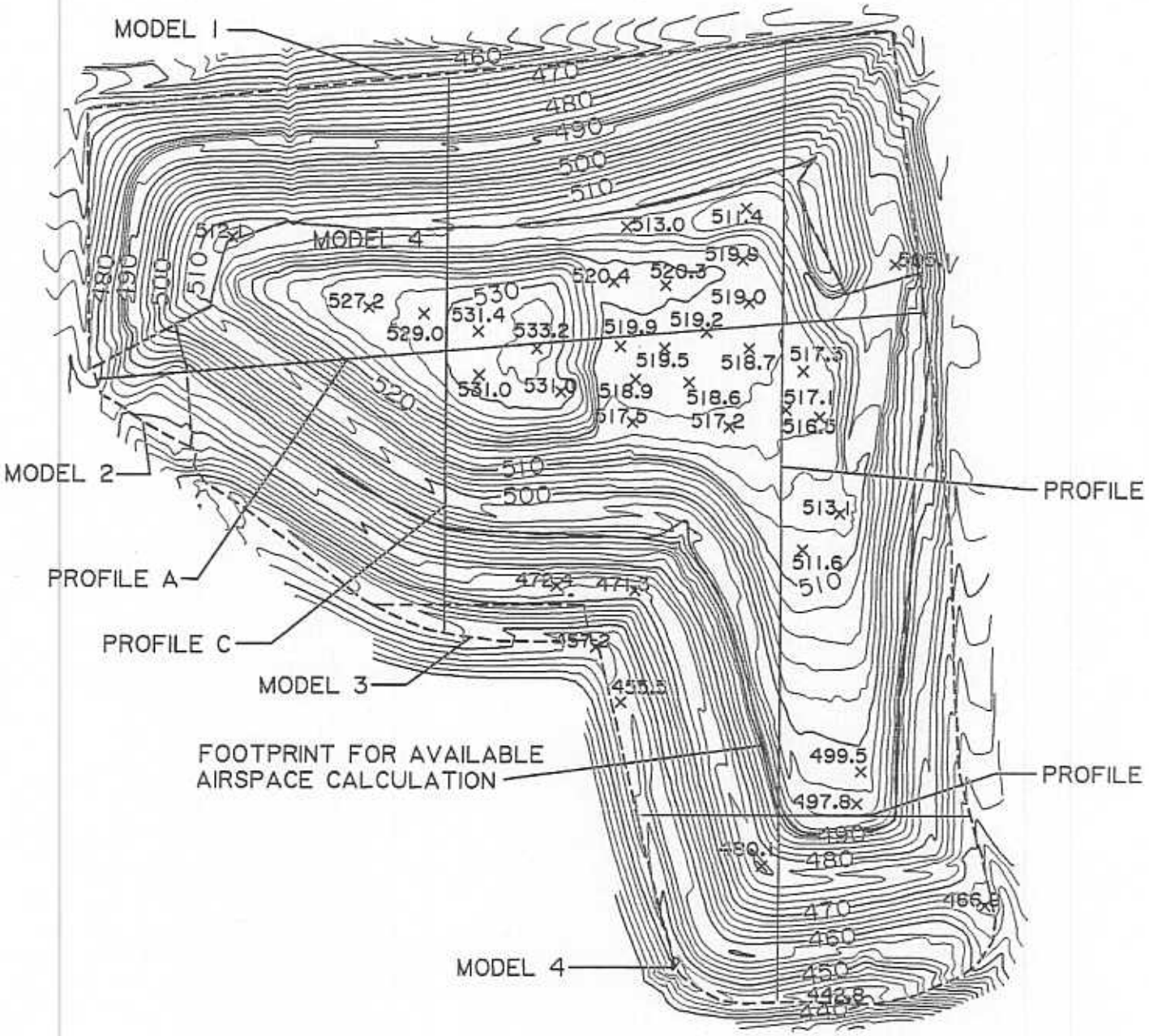
An experienced Kimball photogrammetrist used KORK Digital Mapping Software to compile a digital terrain model (DTM) from the 1" = 250' scale photography on an analytical stereoplotter. A Triangular Irregular Network (TIN) surface was generated using Terramodel software. This surface was compared to the surface from the last volume event of April 2, 2003 and the proposed final surface.

The current Active Cell volume area is now the final area for the volume calculations. The volume area is described in a letter dated March 22, 2001 titled "Correction of Model Boundary, Loudoun County Landfill Volume Studies". The volume area will be used as the basis for all future volume calculations for the Active Cell unless the Loudoun County Office of Solid Waste Management chooses to redefine the area.

Figure 5.1 is a contour map that represents the surface as of April 2, 2003 as determined by Kimball from the previous volumetric update. Figure 5.2 is a contour map that represents the surface as of June 25, 2003. Figure 5.3 is a perspective view of the June 25, 2003 surface. Figure 5.4 is a contour map that represents the surface of the proposed final surface as provided by the County. Figure 5.5 is a perspective view of the final surface.

Profiles at desired locations were also generated. Figures 5.6, 5.7, 5.8 and 5.9 represent profiles at different locations of the surface for the current grade and the proposed final grade.

Figure 5.1



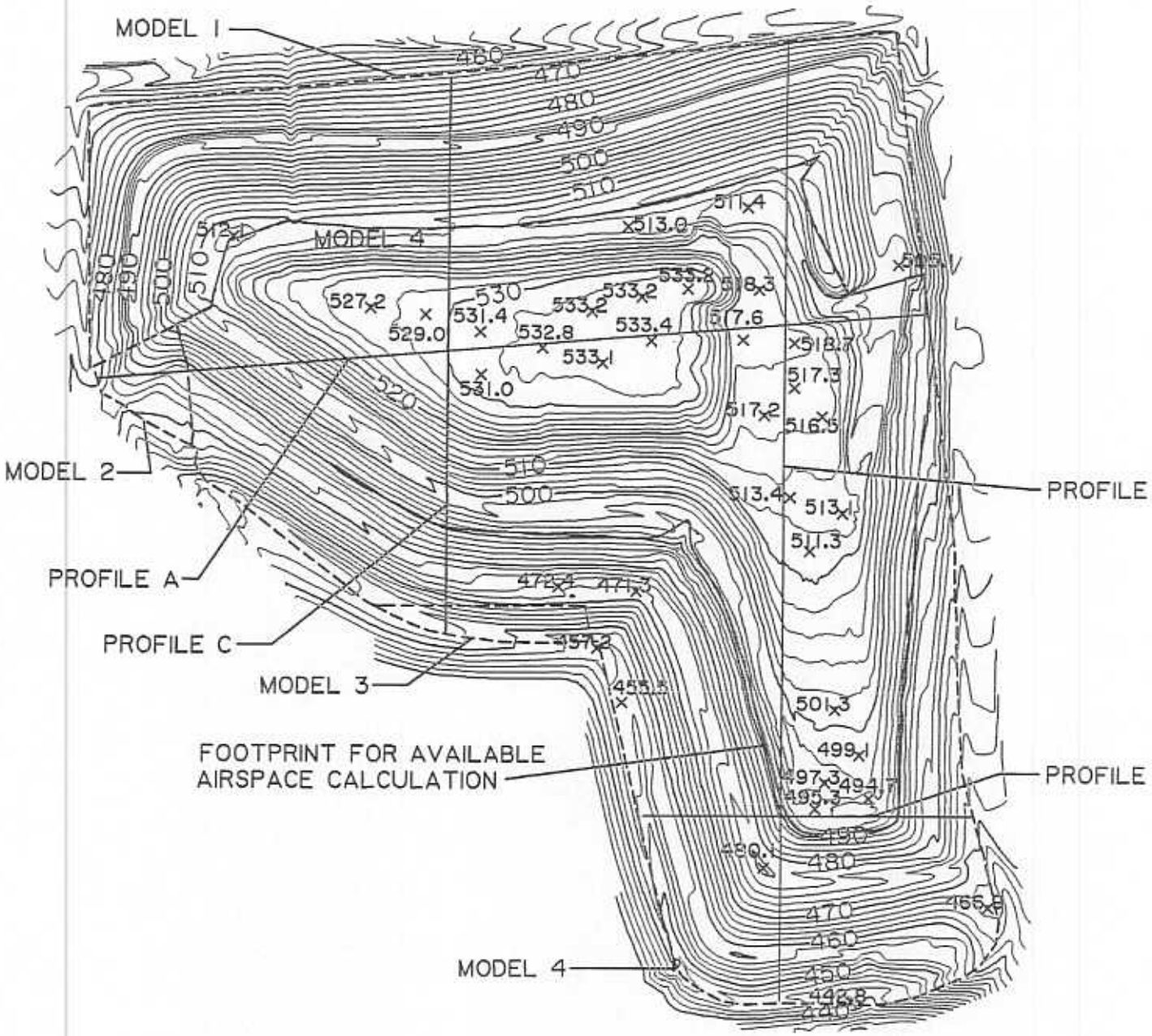
LOUDOUN COUNTY LANDFILL

PREVIOUS CONDITIONS DATED 04-02-03

SCALE 1"=200'

FIGURE 5.1

Figure 5.2

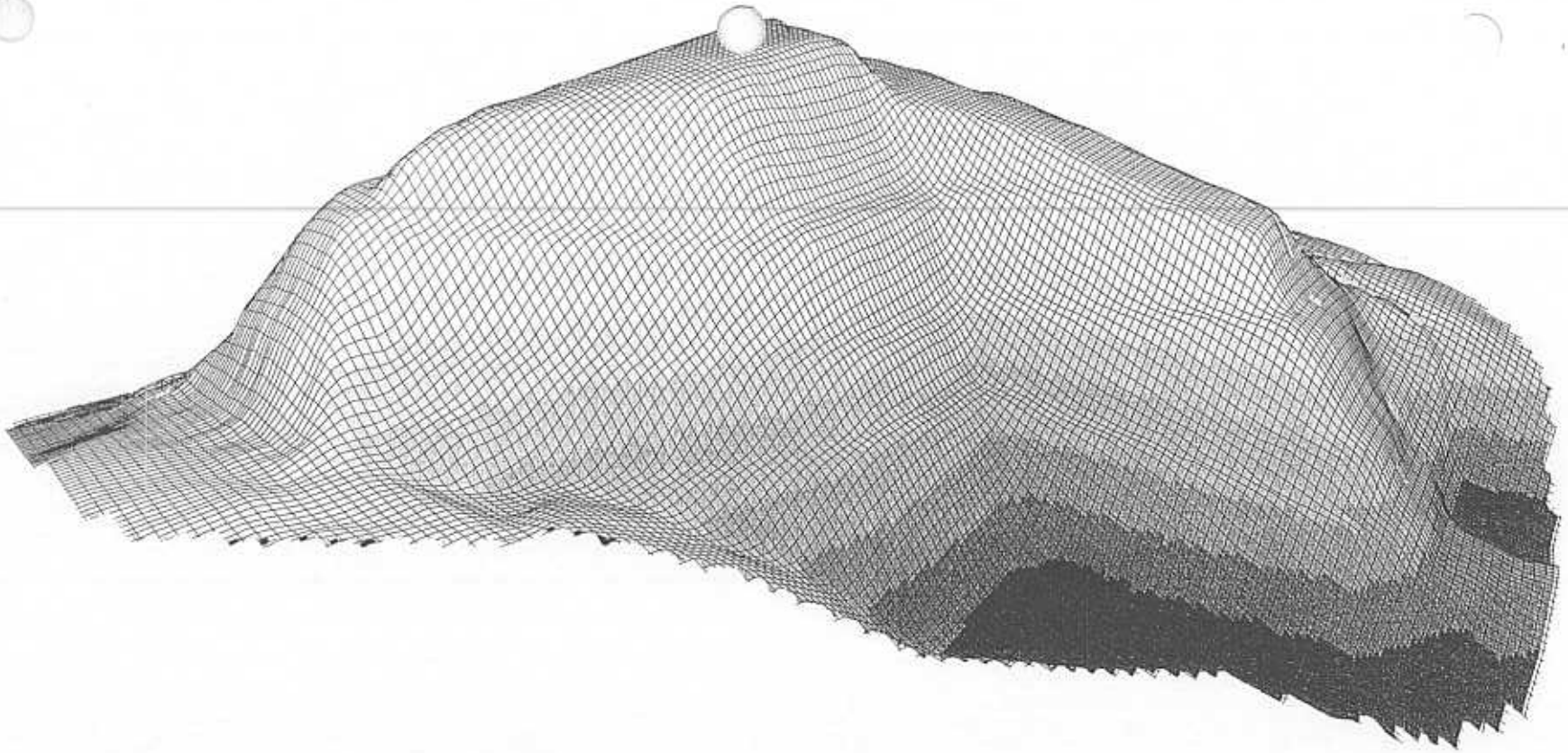


LOUDOUN COUNTY LANDFILL

EXISTING CONDITIONS DATED 06-25-03

SCALE 1"=200'

Figure 5.3

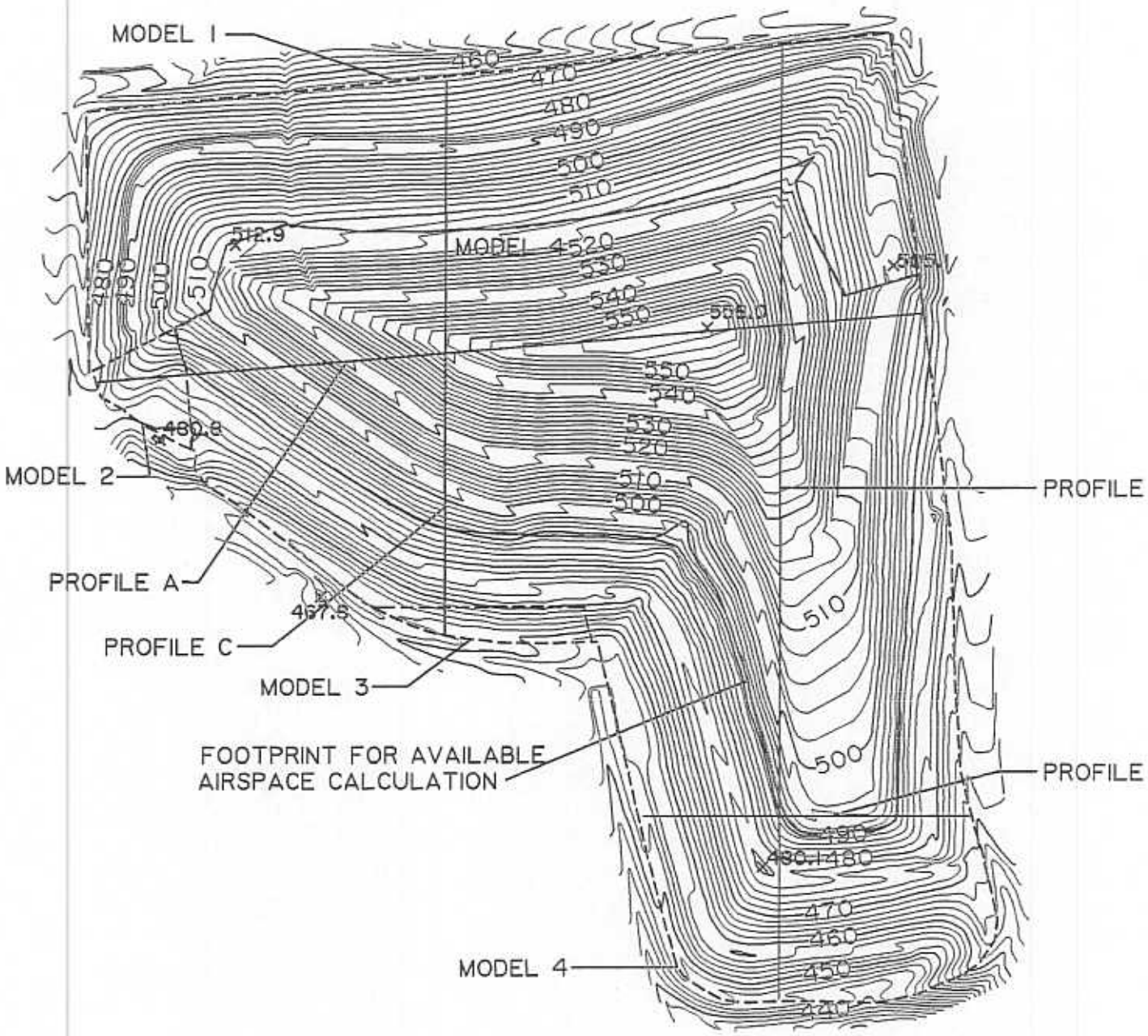


ELEVATION (FEET)

510-532	470-479	430-439
500-509	460-469	420-429
490-499	450-459	
480-489	440-449	

FIGURE 5.3
LOUDOUN COUNTY LANDFILL
PERSPECTIVE VIEW OF EXISTING
CONDITIONS AS OF 06/25/03
(IMAGE VERTICALLY EXAGGERATED BY 5)

Figure 5.4



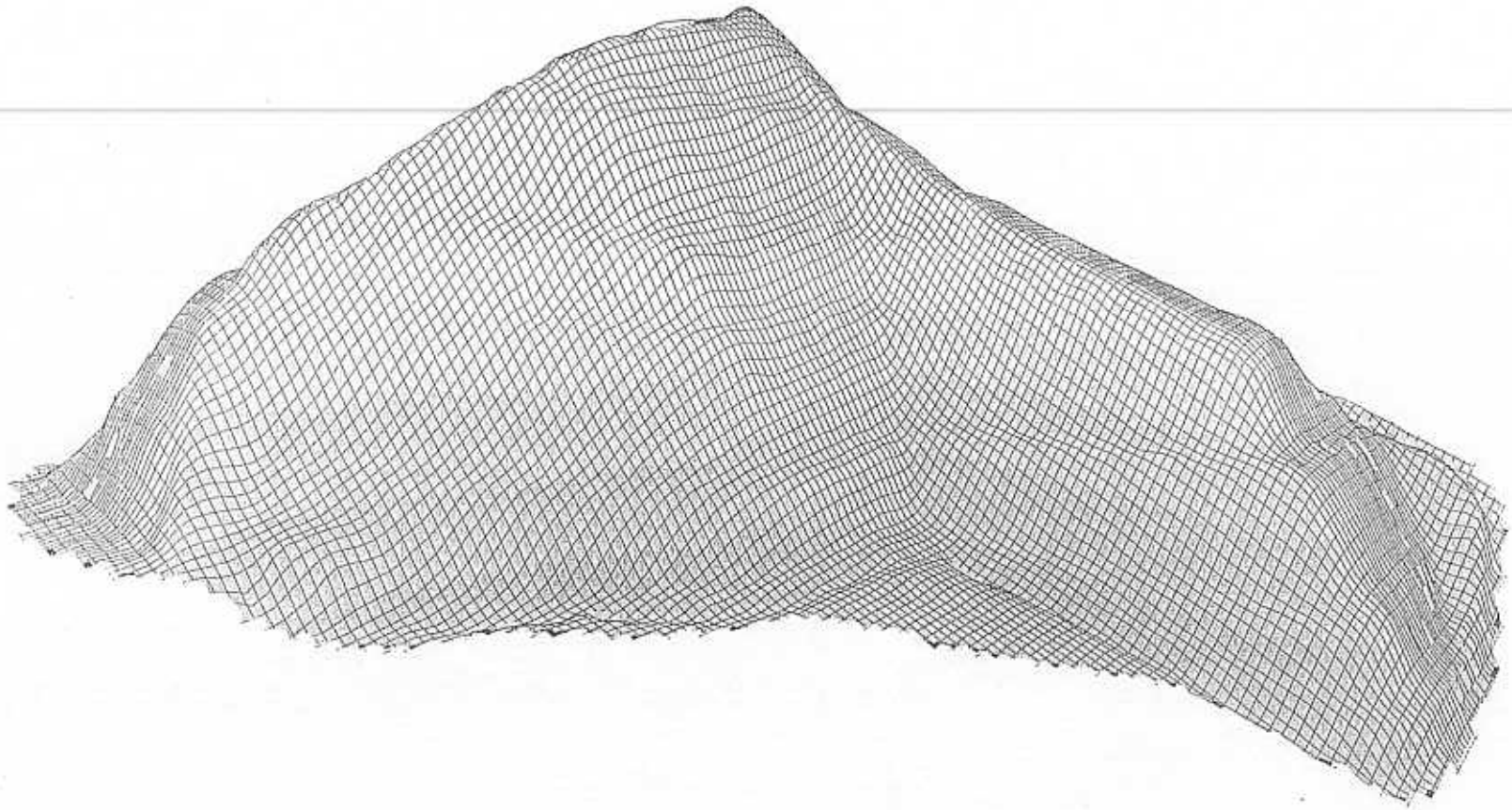
LOUDOUN COUNTY LANDFILL

PROPOSED FINAL GRADE

SCALE 1"=200'

FIGURE 5-1

Figure 5.5



ELEVATION (FEET)

550-564	490-504	430-444
535-549	475-489	415-429
520-534	460-474	
505-519	445-459	

FIGURE 5.5
LOUDOUN COUNTY LANDFILL
PERSPECTIVE VIEW OF
PROPOSED FINAL GRADE
(IMAGE VERTICALLY EXAGGERATED BY 5)

Figure 5.6

FIGURE 5.6

PROFILE A

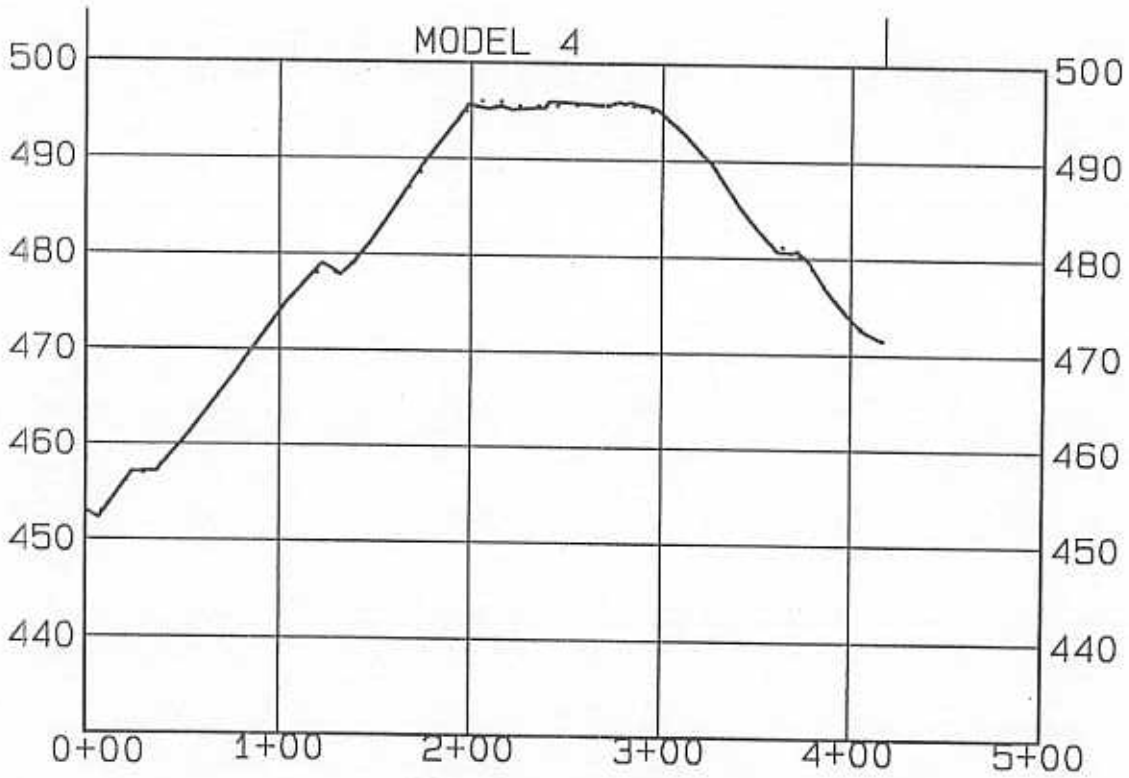
)UDOUN COUNTY LANDFILL

:ALE: 1"=100' HORIZ.

..... PROPOSED FINAL GRADE

Figure 5.7

FIGURE 5.7



PROFILE B

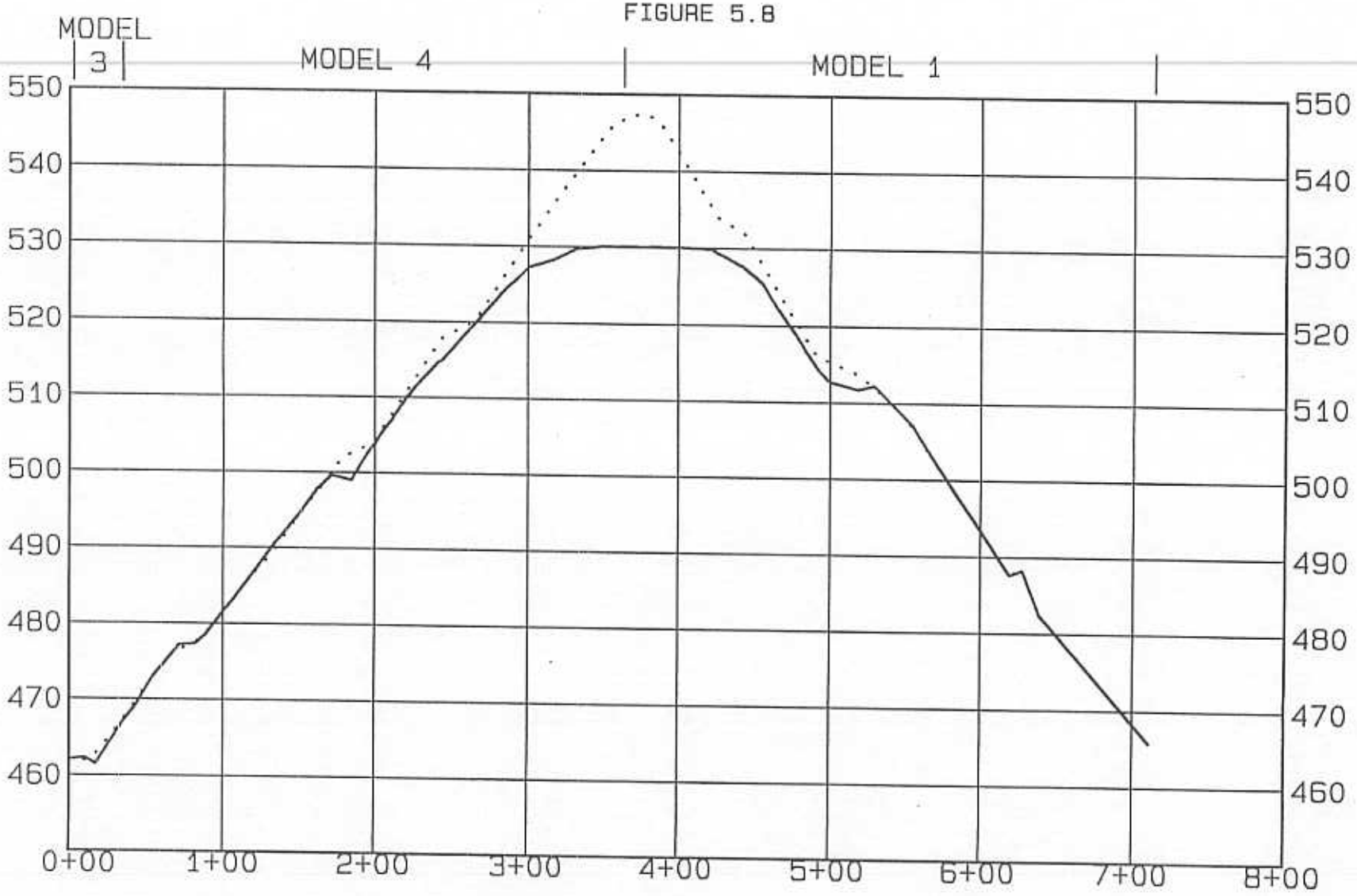
LOUDOUN COUNTY LANDFILL
SCALE: 1"=100' HORIZ.
1"=20' VERT.

..... PROPOSED FINAL GRADE

——— EXISTING CONDITIONS 06-25-03

Figure 5.8

FIGURE 5.8



PROFILE C

LOUDOUN COUNTY LANDFILL

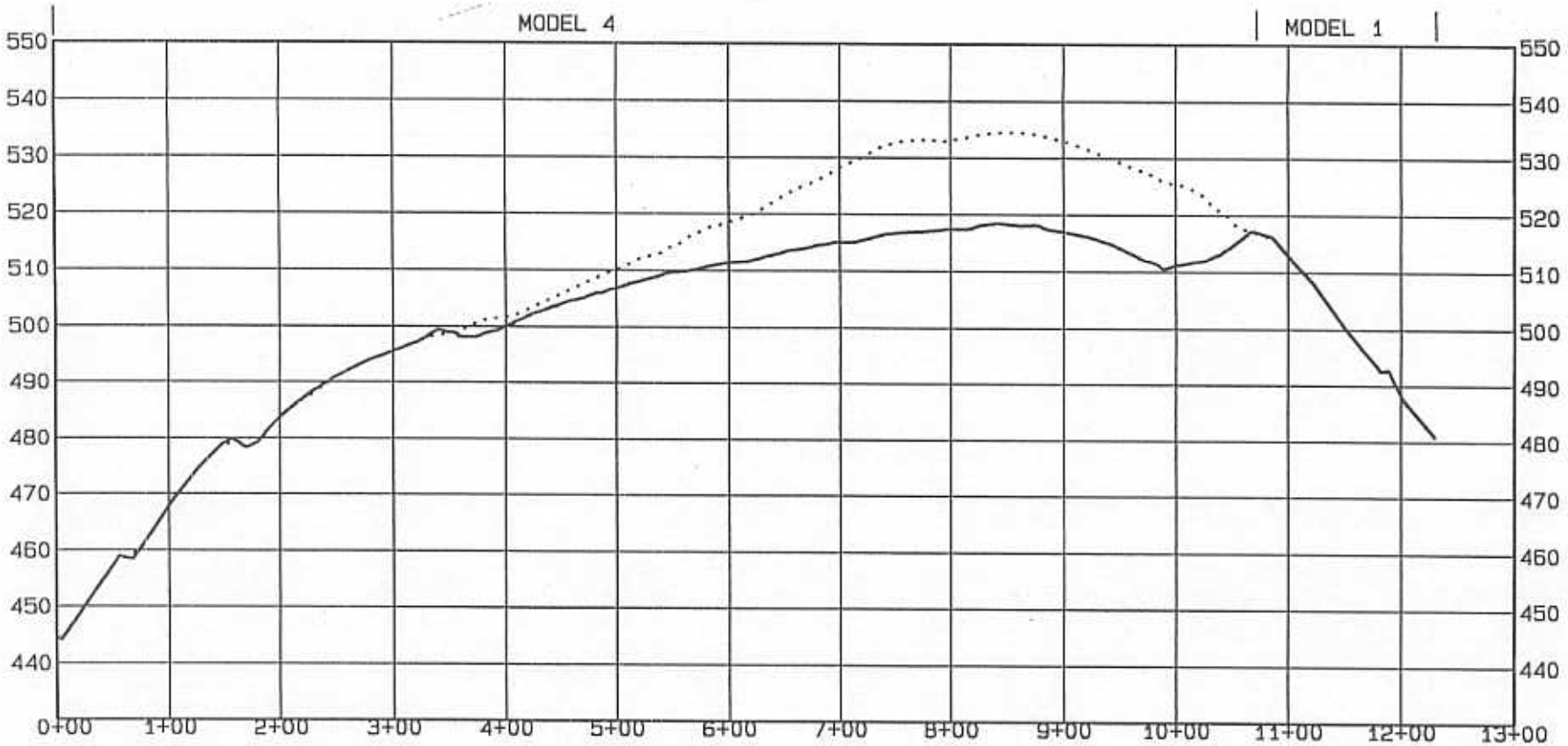
SCALE: 1"=100' HORIZ.
1"=20' VERT.

..... PROPOSED FINAL GRADE

——— EXISTING CONDITIONS 06-25-

Figure 5.9

FIGURE 5.9



PROFILE D

LOUDOUN COUNTY LANDFILL
SCALE: 1"=150' HORIZ.
1"=30' VERT.

..... PROPOSED FINAL GRADE

——— EXISTING CONDITIONS 06-25-03

6. SUMMARY OF RESULTS – Active Cell

Volume calculations were performed for the Active Cell. The volume calculations were then compared to the previous volume calculations. Contour maps, perspective views and profiles were generated. Isopach maps were generated depicting the difference in ground height between the April 2, 2003 and June 25, 2003 events and the current event to final grade.

For each of the volumetric results below, the amount of cut was subtracted from the amount of fill. The amount of cut is excluded from the volume calculation since the cut may or may not have been distributed on the Active Cell.

The difference between the current surface and the surface as of April 2, 2003 represents the amount of new fill. Figure 6.1 is an isopach representing the difference (fill or settlement) between these two surfaces.

The current surface was also compared to the final proposed fill surface to determine the amount of available airspace for disposal. Figure 6.2 is an isopach map representing the difference between these two surfaces.

Volumetric Results:

- Amount of available airspace for refuse and final cover from the surface as of June 25, 2003 to the proposed final surface is 85,513.5 cubic yards.
- A calculation was also made to determine the amount of airspace available for refuse only considering six inches of final cover over the refuse. This yields an available airspace of 78,036.0 cubic yards for refuse. The 6 inches of final cover is 7,477.5 cubic yards.
- Amount of fill added between April 2, 2003 and June 25, 2003 is 16,358.1 cubic yards.

Figure 6.1

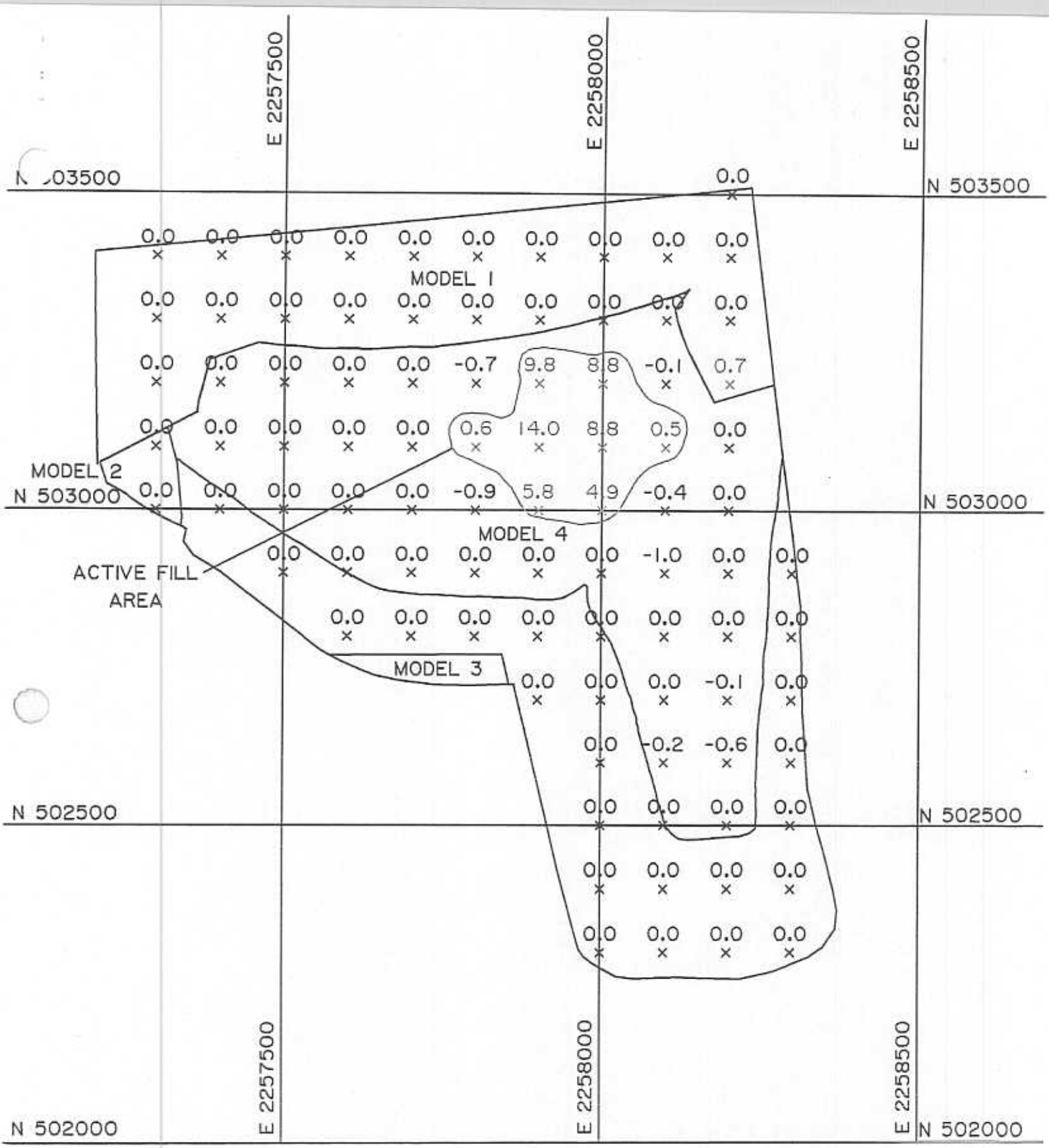


FIGURE 6.1

LOUDOUN COUNTY LANDFILL

ISOPACH COMPARING 06/25/03 AND 04/02/03 CONDITIONS

BLUE DENOTES AREAS OF FILL IN FEET

RED DENOTES AREAS OF CUT OR SETTLEMENT IN FEET

BLACK DENOTES AREAS THAT ARE UNCHANGED

Figure 6.2

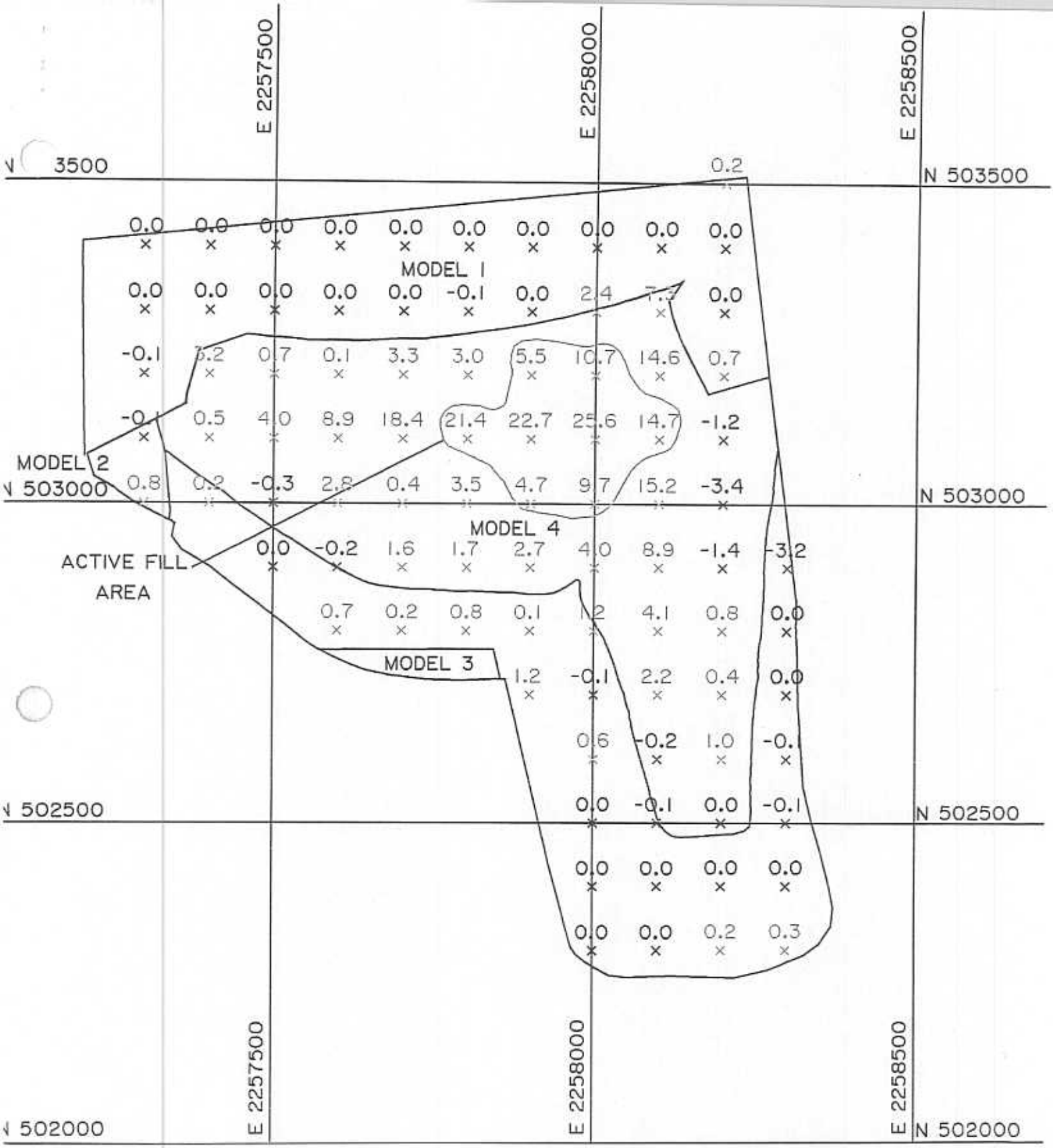


FIGURE 6.2

LOUDOUN COUNTY LANDFILL

ISOPACH COMPARING 06/25/03 AND PROPOSED FINAL GRADE

BLUE DENOTES AVAILABLE AIRSPACE IN FEET

RED DENOTES AREAS EXCEEDING FINAL GRADE IN FEET

SCALE 1" = 200'